

maintained in a safe and suitable condition for service.

(f) *Friction side bearings.* Friction side bearings shall not be run in contact, and shall not be considered to be in contact if there is clearance between them on either side when measured on tangent level track.

(g) *Side bearings.* All rear trucks shall be equipped with side bearings. When the spread of side bearings is 50 inches, their maximum clearance shall be 3/8 inch on each side for rear trucks and 3/4 inch on each side for front trucks, where used. When the spread of the side bearings is increased, the maximum clearance shall be increased proportionately.

§ 230.110 Pilots.

(a) *General provisions.* Pilots shall be securely attached, properly braced, and maintained in a safe and suitable condition for service.

(b) *Minimum and maximum clearance.* The minimum clearance of pilot above the rail shall be 3 inches and the maximum clearance shall be 6 inches measured on tangent level track.

§ 230.111 Spring rigging.

(a) *Arrangement of springs and equalizers.* Springs and equalizers shall be arranged to ensure the proper distribution of weight to the various wheels of the steam locomotive, maintained approximately level and in a safe and suitable condition for service. Adjusting weights by shifting weights from one pair of wheels to another is permissible.

(b) *Spring or spring rigging condemning defects.* Springs or spring rigging with any of the following defects shall be removed from service immediately and renewed or properly repaired:

(1) Top leaf broken or two leaves in top half or any three leaves in spring broken. (The long side of a spring to be considered the top.) Broken springs not exceeding these requirements may be

repaired by applying clips providing the clips can be made to remain in place;

(2) Any spring with leaves excessively shifting in the band;

(3) Broken coil springs; or

(4) Broken driving box saddle, equalizer, hanger, bolt, or pin.

WHEELS AND TIRES

§ 230.112 Wheels and tires.

(a) *Mounting.* Wheels shall be securely mounted on axles. Prick punching or shimming the wheel fit will not be permitted. The diameter of wheels on the same axle shall not vary more than 3/32 inch.

(b) *Gage.* Wheels used on standard gage track will be out of gage if the inside gage of flanges, measured on base line is less than 53 inches or more than 53 3/8 inches. Wheels used on less than standard gage track will be out of gage if the inside gage of flanges, measured on base line, is less than the relevant track gage less 3 1/2 inches or more than the relevant track gage less 3 3/8 inches.

(c) *Flange distance variance.* The distance back to back of flanges of wheels mounted on the same axle shall not vary more than 1/4 inch.

(d) *Tire thickness.* Wheels may not have tires with a minimum thickness less than that indicated in the table in this paragraph (d). When retaining rings are used, measurements of tires to be taken from the outside circumference of the ring, and the minimum thickness of tires may be as much below the limits specified earlier in this paragraph (d) as the tires extend between the retaining rings, provided it does not reduce the thickness of the tire to less than 1 1/8 inches from the throat of flange to the counterbore for the retaining rings. The required minimum thickness for tires, by wheel center diameter and weight per axle, is as follows:

Weight per axle (weight on drivers divided by number of pairs of driving wheels)	Diameter of wheel center (inches)	Minimum thickness (inches)
30,000 pounds and under	44 and under	1/4
	Over 44 to 50	1 5/16
	Over 50 to 56	1 3/8
	Over 56 to 62	1 7/16
	Over 62 to 68	1 1/2
	Over 68 to 74	1 9/16

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Weight per axle (weight on drivers divided by number of pairs of driving wheels)	Diameter of wheel center (inches)	Minimum thickness (inches)
Over 30,000 to 35,000 pounds	Over 74	1 ⁵ / ₈
	44 and under	1 ⁵ / ₁₆
	Over 44 to 50	1 ³ / ₈
	Over 50 to 56	1 ⁷ / ₁₆
	Over 56 to 62	1 ¹ / ₂
	Over 62 to 68	1 ⁹ / ₁₆
	Over 68 to 74	1 ³ / ₈
Over 35,000 to 40,000 pounds	Over 74	1 ¹¹ / ₁₆
	44 and under	1 ³ / ₈
	Over 44 to 50	1 ⁷ / ₁₆
	Over 50 to 56	1 ¹ / ₂
	Over 56 to 62	1 ⁹ / ₁₆
	Over 62 to 68	1 ³ / ₈
	Over 68 to 74	1 ¹¹ / ₁₆
Over 40,000 to 45,000 pounds	Over 74	1 ³ / ₄
	44 and under	1 ⁷ / ₁₆
	Over 44 to 50	1 ¹ / ₂
	Over 50 to 56	1 ⁹ / ₁₆
	Over 56 to 62	1 ³ / ₈
	Over 62 to 68	1 ¹¹ / ₁₆
	Over 68 to 74	1 ³ / ₄
Over 45,000 to 50,000 pounds	Over 74	1 ¹³ / ₁₆
	44 and under	1 ¹ / ₂
	Over 44 to 50	1 ⁹ / ₁₆
	Over 50 to 56	1 ³ / ₈
	Over 56 to 62	1 ¹¹ / ₁₆
	Over 62 to 68	1 ³ / ₄
	Over 68 to 74	1 ¹³ / ₁₆
Over 50,000 to 55,000 pounds	Over 74	1 ⁷ / ₈
	44 and under	1 ⁹ / ₁₆
	Over 44 to 50	1 ³ / ₈
	Over 50 to 56	1 ¹¹ / ₁₆
	Over 56 to 62	1 ³ / ₄
	Over 62 to 68	1 ¹³ / ₁₆
	Over 68 to 74	1 ⁷ / ₈
Over 55,000 pounds	Over 74	1 ¹⁵ / ₁₆
	44 and under	1 ³ / ₈
	Over 44 to 50	1 ¹¹ / ₁₆
	Over 50 to 56	1 ³ / ₄
	Over 56 to 62	1 ¹³ / ₁₆
	Over 62 to 68	1 ⁷ / ₈
	Over 68 to 74	1 ¹⁵ / ₁₆
Over 74	2	

(e) *Tire width.* Flanged tires shall be no less than 5½ inches wide for standard gage and no less than 5 inches wide for narrow gage. Plain tires shall be no less than 6 inches wide for standard gage and no less than 5½ inches wide for narrow gage.

§ 230.113 **Wheels and tire defects.**

Steam locomotive and tender wheels or tires developing any of the defects listed in this section shall be removed from service immediately and repaired. Except as provided in §230.114, welding on wheels and tires is prohibited. A wheel that has been welded is a welded wheel for the life of the wheel.

(a) *Cracks or breaks.* Wheels and tires may not have a crack or break in the

flange, tread, rim, plate, hub or brackets.

(b) *Flat spots.* Wheels and tires may not have a single flat spot that is 2½ inches or more in length, or two adjoining spots that are each two or more inches in length.

(c) *Chipped flange.* Wheels and tires may not have a gouge or chip in the flange that is more than 1½ inches in length and ½ inch in width.

(d) *Broken rims.* Wheels and tires may not have a circumferentially broken rim if the tread, measured from the flange at a point ⅝ inch above the tread, is less than 3¾ inches in width.

(e) *Shelled-out spots.* Wheels and tires may not have a shelled-out spot 2½ inches or more in length, or two adjoining spots that are each two or more